Geometry, Physics, and Representation Theory
Northeastern University

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Morse theory and exponential functions in positive characteristic

Abstract. Morse theory expresses the cohomology of a space X in terms of invariants of critical loci of a Morse function f on X. Algebraically, the former is encoded in the de Rham complex of X. The latter can be calculated from a twisted version of the de Rham complex constructed from f. In analytic geometry these two complexes can be shown to have the same cohomology, however the construction uses the non-algebraic function $\exp(f)$.

In my talk I will explore how far the notion of $\exp(f)$ can be pushed over fields of positive characteristic, leading us to open questions about existence of lifts of the Frobenius and Adams operations for matrix factorizations. This is joint work with Dima Arinkin and Marton Hablicsek.